

**California MMLPA Master Plan Science Advisory Team
Preliminary Overview Evaluation of Central Coast Regional
Stakeholder Group Candidate MPA Packages
November 22, 2005**

Introduction

Members of the Central Coast Regional Stakeholder Group (CCRSG) submitted three draft proposals for MPAs in central California; a fourth proposal is anticipated and three additional proposals were submitted by interested groups outside the CCRSG. The MLPA Blue Ribbon Task Force (BRTF) is scheduled to hear presentations about the draft proposals on November 29 and 3, 2005. Both the CCRSG and BRTF have requested SAT input on all the draft proposals. The SAT has insufficient time to thoroughly review the seven proposals prior to the BRTF meeting, but understands it is valuable to provide general guidance to help the CCRSG generate suitable proposals prior to its December 2005 meeting.

To assist in the development of the draft proposals, the SAT provides the following general comments and advice:

1. The GIS developed for this process is an extremely valuable tool. The large number of data sources, the wide range in quantity and quality of data available for use in the GIS, and the intensity of the MLPA process, however, makes it likely that there will be many errors in the GIS analysis. We identified and changed some errors for our analysis, while recognizing that there may be additional errors. An example of this is that the GIS analysis suggests some of the proposed MPAs are composed of completely soft sediment, when we know that there are rocky habitats throughout those MPAs. Another example is that many pinnacles are not identified in the GIS, and therefore percentage of available pinnacles that are being protected is an overestimate. For this reason, the SAT suggests that the CCRSG and BRTF think in terms of spatial scales of habitat coverage and not be too concerned about actual numbers presented. The overall approach to protection of habitats, replications, and distribution (size and spacing) is more relevant than the actual percentage of a particular habitat type in a proposed MPA.
2. There are fewer human use data layers than biotic data layers. For this reason, the SAT advice at the moment is heavily based on a biotic analysis.
3. The SAT recognizes the critical value of establishing MPAs that can be effectively monitored and evaluated. The SAT is willing to provide more proactive advice on how to develop performance measures to evaluate effectiveness of the MPA array, and also to identify how MPAs can be used to address poorly understood scientific aspects of MPAs as a resource management tool. Where possible, the CCRSG and BRTF should consider an array of MPAs that will enable the scientific testing of some of these critical unknowns. For example, the level of protection of an SMCA will vary depending upon the exceptions to the regulations (e.g., the type of fishing gear allowed for use in the SMCA).

Another example is the relative benefit of pairing a SMCA with a SMR (buffer concept). A third example is the effects of various types of MPAs on populations of individual species.

4. SMCAs have varying conservation values, depending upon the species taken, the amount of take, the associated amount of bycatch, and the associated habitat type and water depth. At a recent national meeting on benthic-pelagic habitat coupling, scientists and fishermen agreed that in waters less than 50 m deep, the bottom and water column habitats are closely linked. In waters greater than that depth, the associations are less strong. That means that a SMCA that allows salmon fishing in shallow water affords little protection for benthic species, whereas in deeper water, there is less of an impact from salmon trolling.
5. Some of the MPA designs were clearly attempts at compromise between different user groups. The SAT applauds these attempts at compromise among different stakeholders. Although compromise between users is good, we must caution that sometimes compromise comes at the expense of failing to achieve conservation goals.
6. In reviewing the draft proposals, the SAT assumed that incidental take was not allowed unless specified. We did evaluate the potential for incidental take (bycatch) when reviewing the conservation objectives of the proposed MPAs. For instance, we divided the SMCA category into three levels of protection:

SMCAs with High Protection prohibit take of all species except salmon and coastal pelagic fishes in water depths greater than 50 m.

SMCAs with Moderate Protection prohibit take of all species except salmon, pelagic fishes, squid, crab, and spot prawns.

SMCAs with Low Protection allow various forms of commercial and recreational fishing, and the potential bycatch from these fisheries will limit the conservation value of those MPAs.

7. Size and spacing are not independent. Smaller MPAs need to be closer together to achieve conservation objectives. Likewise, larger MPAs can be further apart. When providing advice, the SAT will consider the size of a habitat type within a MPA and the distance between similar types of protected habitats.

General Observations about Proposed MPA Packages

1. Some of the proposals omit protection for some of the habitats identified in the MLPA. There needs to be an even representation of habitat protection throughout the study region.
2. There needs to be an even distribution of levels of protection throughout the study region. For instance, some packages provide for a higher level of protection (i.e., SMR and SMCA High) in the northern part of the study region than in the south.

3. Some of the packages provide for a SMCA that prohibits all take except salmon. Boundaries of many of these SMCAs extend from the coast out to deep water (beyond 50 m). The conservation value of such an MPA is compromised because of the potential bycatch of the salmon fishing gear in shallow water. The SAT recommends that the conservation value of these SMCAs would be increased if all fishing were prohibited at water depths less than 50 m (i.e., a SMR from the coast to 50 m of water and a SMCA with salmon fishing in deeper water).
4. There is value in having a SMCA adjacent to a SMR in similar habitats and water depths to allow for an evaluation of the relative benefits of each type of level of protection.
5. Some of the packages opted for clustering several small (less than the SAT guidelines of 3 mi in length) MPAs (e.g., Monterey Peninsula). This approach may provide increased conservation value for some species while limiting user conflicts. Smaller ranging species will accrue the most benefit from such an arrangement.
6. Elkhorn Slough and Morro Bay estuaries are the only two estuaries of any size in the study region and serve as important nursery grounds and adult feeding and spawning habitats for many marine fishes. These areas need to have effective protection as part of the MPA array.
7. Habitats associated with headlands should be considered as high priority for protection because of their link to zones of upwelling, increased productivity, and larval and juvenile retention. Because headlands are more exposed to coastal current regimes, they are also likely to act as good source locations for enriching adjacent unprotected areas and facilitating connectivity within the MPA network. These zones are noted feeding areas for birds, mammals, fishes, and turtles.

Specific Comments about Proposed Packages

Package 1

- Many of the SMCAs in this package have reduced conservation value because of the allowances for various types of fishing. There are two ways to improve the conservation value for those areas. The first is to prohibit salmon fishing in waters shallower than 50 m (i.e. make shallow portions SMRs). An example of this is the Julia Pfeiffer Burns SMCA. The second is to reconsider the occurrence of recreational fishing in some of the SMCAs (e.g., Morro Bay estuary, Cambria SMCA).
- There is a lower level of protection for all habitats south of the proposed Alder Creek MPAs. The SMCAs in the south result in low conservation value because of the various fishing allowances and there are few SMRs proposed for that region.
- This proposal provides strong conservation value for sand beaches, rocky intertidal, coastal marshes, tidal flats, surf grass and eelgrass, and persistent kelp habitats.

- Shallow (0-30 m) rock reef habitat appears to be adequately protected in this package.
- This proposal provides good protection of deep water (> 200 m) canyon habitats in Soquel Canyon and one canyon off Big Sur.
- The shallower portions of canyon habitats do not have as strong protection as the deeper canyon habitats because of fishing allowances.
- The SAT suggests the proponents consider an allowance for some limited scientific take in the Ed Ricketts SMCA in order to meet the MLPA program objectives to monitor and evaluate MPA performance.

Package 2

- All habitats in this package appear to have adequate conservation value. Excluding pinnacle habitat, because of its poor representation in the GIS, strong protection ranges from about 15% to 45% of the available habitats in this region.
- Relative to other packages, this proposal provides strong protection for deep water habitats, including submarine canyons.
- Habitat protection is strong in both Elkhorn Slough and Morro Bay estuaries.
- The four MPAs in the Año Nuevo area are disjointed and could be simplified by creating one SMR and one SMCA in order to provide protection of forage species for marine vertebrates.
- The MPA at Point Lobos ends just short of the end of the reef at Yankee Point. This will result in reduced conservation value (because fish could leave the MPA and get caught) but may result in fishery benefits or scientific benefits by providing an opportunity to test the value of protecting only a portion of a reef.

Package 4

- There is a lower level of protection for all habitats south of Cambria in this proposal. The SMCAs in this proposal in general, and in the south in particular, result in lower conservation value because of the allowance for salmon fishing in shallow water. This would result in bycatch of various species. This could be remedied by classifying the shallow portions of the SMCAs as SMRs. If this were accomplished, it would also provide more conservation benefits for intertidal and shallow subtidal habitats.
- Many of the MPAs in this proposal extend to the three-mile limit of state waters and afford a continuum of protection from shallow to deep water.
- This proposal provides good protection of deep water (> 100 m) canyon habitats in Soquel Canyon and canyons off Big Creek.

- The conservation value of this proposal would be stronger if the estuarine habitats of Elkhorn Slough and Morro Bay had a higher level of protection, because they serve as important nursery grounds and adult feeding and spawning habitats for many marine fishes.
- The small (< 3 mi long) SMRs in this proposal should be extended to meet the size guidelines provided by the SAT.

Package A

- Most habitats in this package appear to have adequate conservation value. Strong protection ranges from about 10% to 35% of the available habitats in this region. Habitats with lesser protection (i.e., less than 10% available protected) in this package include tidal flats, eelgrass beds, estuarine habitats, deep sand (100-200 m), deep rock (> 200 m), and shallow canyon heads (0-30 m).
- This package in general does a good job of protecting several headlands that support high biological productivity. An example of this is the inclusion of the very productive habitats that occur in the lee of Point Sur.
- This proposal provides good protection of deep water (> 100 m) canyon habitats in Soquel Canyon and canyons off Big Creek.
- The conservation value of this proposal would be stronger if a greater proportion of the estuarine habitats of Morro Bay had a higher level of protection, because they serve as important nursery grounds and adult feeding and spawning habitats for many marine fishes.
- Many of the MPAs in this proposal extend to the three-mile limit of state waters and afford a continuum of protection from shallow to deep water.
- This package proposed a MPA that was much larger than the minimum the SAT recommended. Having a MPA larger than the minimum size will help scientists design experiments to evaluate the levels of protection afforded by different sizes of MPAs.

Preliminary Evaluation of Proposals for Candidate MPA Packages in the Central Coast Study Region

Presented by the MLPA Master Plan Science Advisory Team

Presentation to the MLPA Blue Ribbon Task Force
November 29, 2005 • Monterey, CA

Four Components of Proposal Evaluation

1. Overall package review
2. Network analysis by habitat type
3. Quantitative analyses (in progress)
4. Potential solutions
 - optional candidate MPAs
 - socioeconomic costs/benefits

1. Overall package review

- based on ecosystem protection goals
- consider each proposal package collectively
- categorize by level of protection (SMR, SMP, SMCA)
- by habitat type

- general observations (common among packages)
- each package separately

General Observations

- 1) Some proposals omit protection for some habitats. Even representation of habitat protection throughout the study region is necessary.

- 2) Some packages provide for different levels of protection in different regions (e.g., northern region vs. southern). An even distribution of levels of protection throughout the study region is necessary.

General Observations

- 3) Level of SMCA protection depends on species allowed to be taken (e.g., salmon) and depth. The conservation value of an SMCA is compromised because of potential by-catch of resident species in shallow water.

“SAT recommendation”: conservation value of SMCAs increased if all fishing were prohibited at water depths less than 50 m

e.g., a SMR from the coast to 50 m of water and a SMCA with fishing of pelagic transient species and others in deeper water.

General Observations

- 4) Value of a SMCA adjacent to a SMR in similar habitats and water depths to allow for evaluation of relative benefits of each level of protection.

- 5) Some packages opted for clustering several small (less than SAT size guidelines) MPAs (e.g., Monterey Peninsula).

This approach may increase conservation value for some species while limiting user conflicts.

Smaller ranging species will accrue the most protection from this arrangement.

General Observations

- 6) Elkhorn Slough and Morro Bay estuaries are rare and ecologically important ecosystems. These need to have effective protection as part of the MPA array.
- 7) Habitats associated with headlands should be given high priority for protection
 - zones of upwelling and increased productivity
 - as sources of larvae - facilitate larval connectivity
 - as areas of retention - noted feeding areas for birds, mammals, fishes, and turtles.

Levels of Protection

State Marine Reserve (SMR): Highest level of protection

State Marine Conservation Areas (SMCAs):

- **SMCA with High Protection:** prohibits take of all species except salmon and coastal pelagic fishes in water depths greater than 50 m
- **SMCA with Moderate Protection:** prohibits take of all species except salmon, pelagic fishes, squid, crab, and spot prawns
- **SMCA with Low Protection:** allows various forms of both commercial and recreational fishing

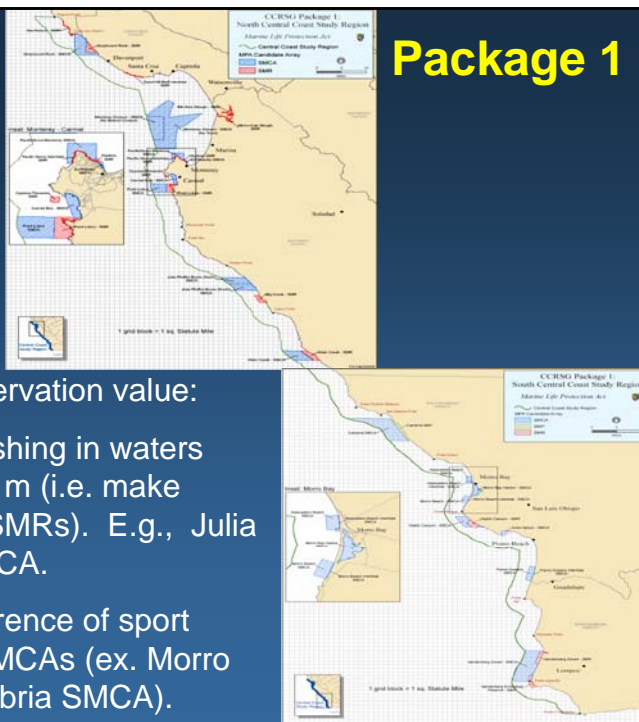
State Marine Park (SMP): Lowest level of protection, prohibits commercial take only

Many SMCAs have reduced conservation value - allowances for various types of fishing.

Improve SMCA conservation value:

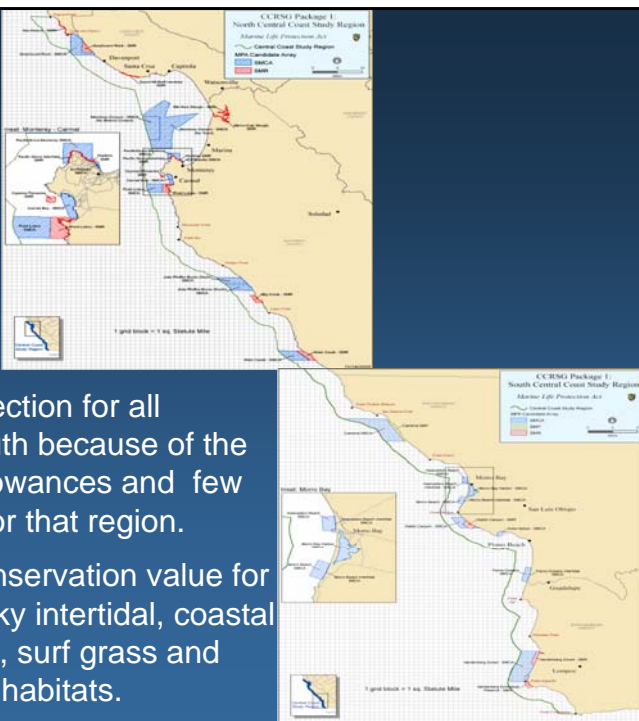
1. Prohibit salmon fishing in waters shallower than 50 m (i.e. make shallow portions SMRs). E.g., Julia Pfeiffer Burns SMCA.
2. Reconsider occurrence of sport fishing in some SMCAs (ex. Morro Bay estuary, Cambria SMCA).

Package 1

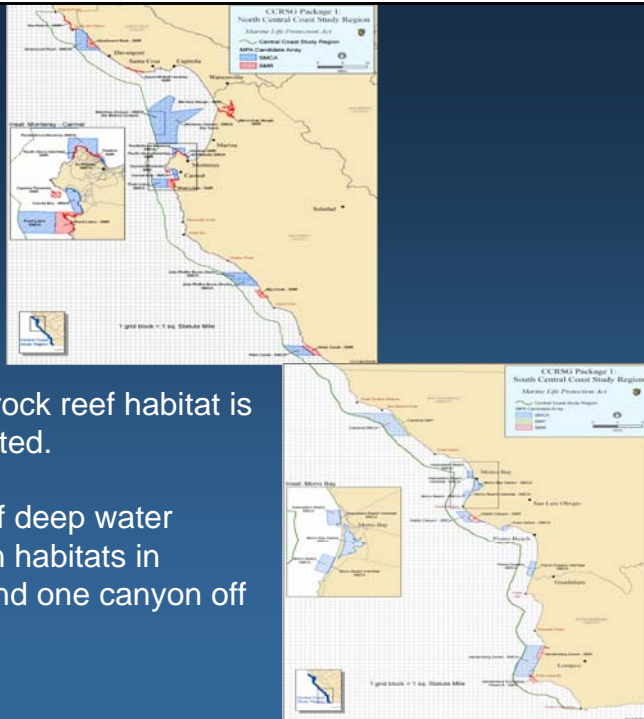


Package 1

- Lower level of protection for all habitats to the south because of the various fishing allowances and few SMRs proposed for that region.
- Provides strong conservation value for sand beaches, rocky intertidal, coastal marshes, tidal flats, surf grass and eelgrass, and kelp habitats.

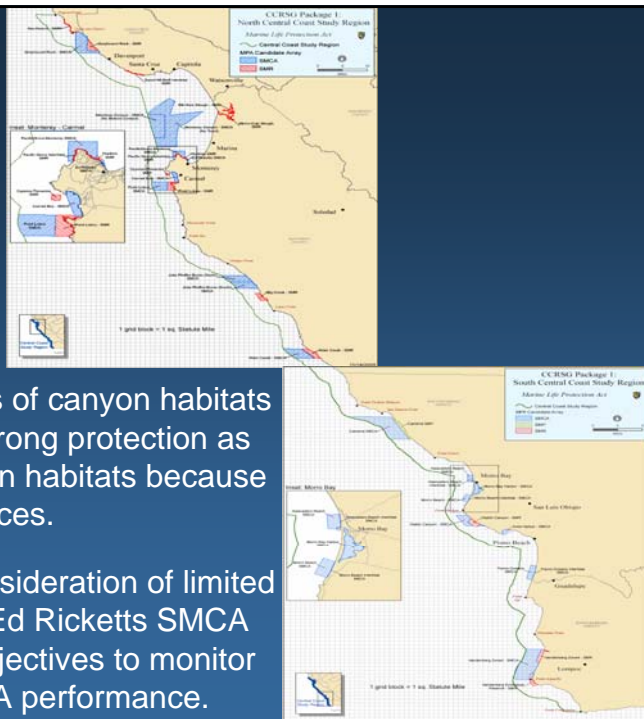


Package 1



- Shallow (0-30 m) rock reef habitat is adequately protected.
- Good protection of deep water (> 200 m) canyon habitats in Soquel Canyon and one canyon off Big Sur.

Package 1

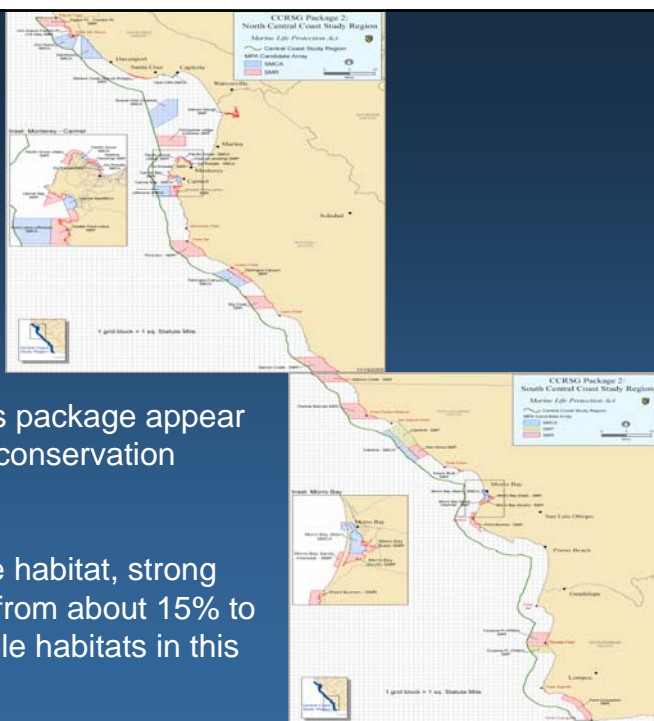


- Shallower portions of canyon habitats do not have as strong protection as the deeper canyon habitats because of fishing allowances.
- SAT suggests consideration of limited scientific take in Ed Ricketts SMCA to meet MLPA objectives to monitor and evaluate MPA performance.

Package 2

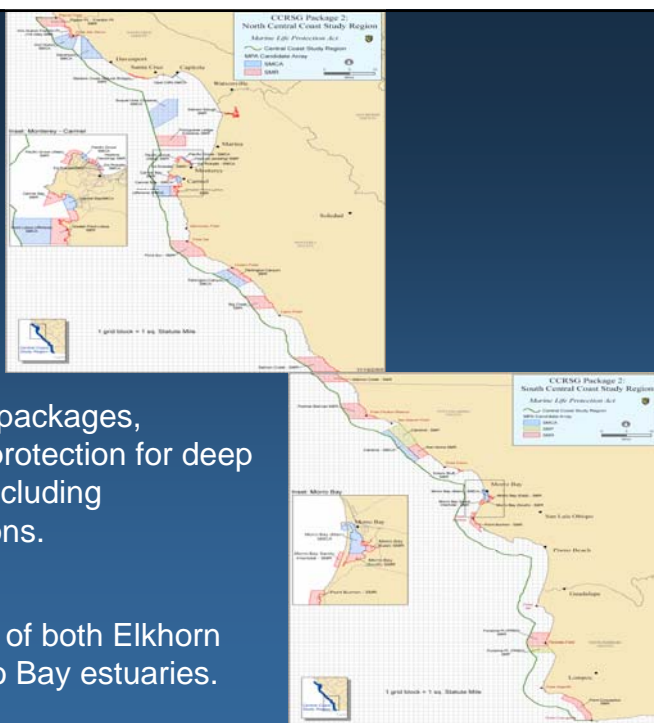
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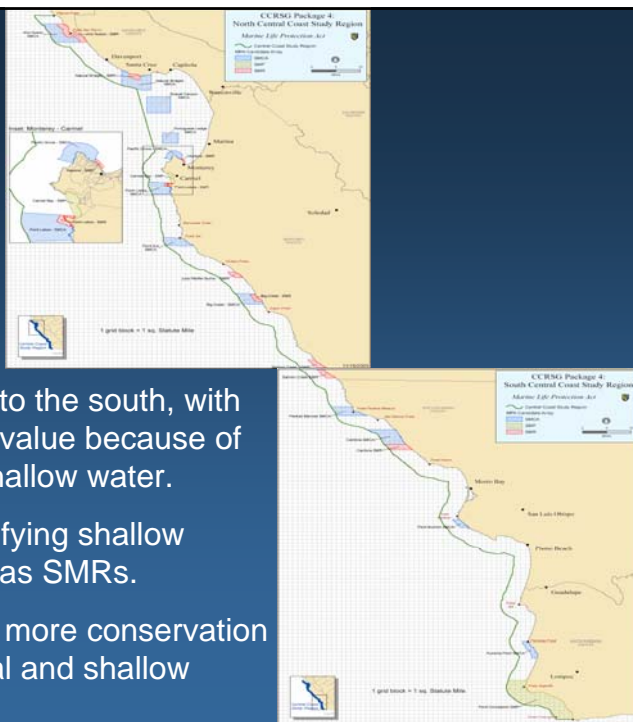
Package 2

- Relative to other packages, provides strong protection for deep water habitats, including submarine canyons.
- Strong protection of both Elkhorn Slough and Morro Bay estuaries.



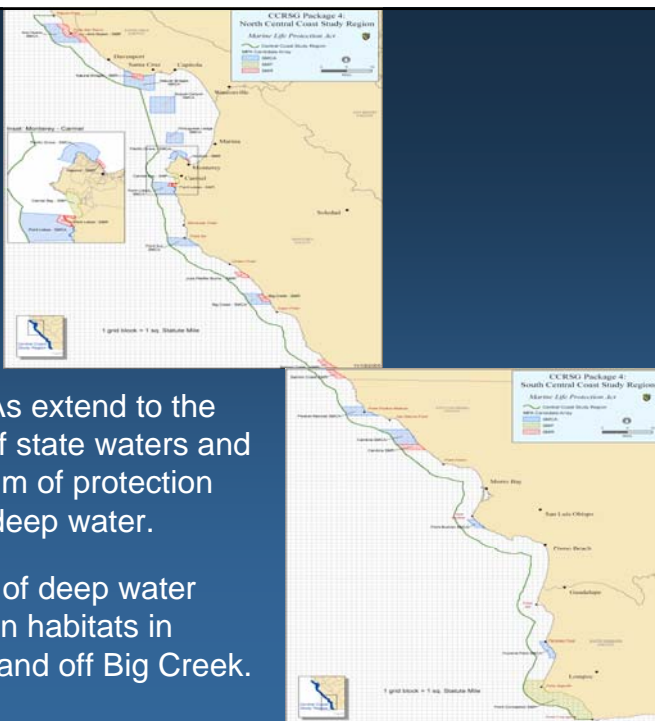
Package 4

- Lower level of protection for all habitats south of Cambria.
- SMCAs, especially to the south, with lower conservation value because of salmon fishing in shallow water.
- Remedied by classifying shallow portions of SMCAs as SMRs.
- Would also provide more conservation benefits for intertidal and shallow subtidal habitats.



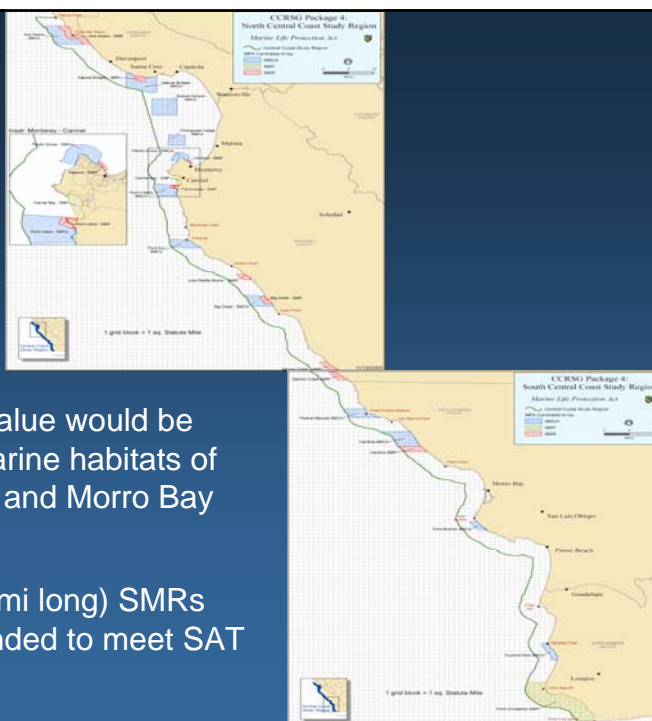
Package 4

- Many of the MPAs extend to the three-mile limit of state waters and afford a continuum of protection from shallow to deep water.
- Good protection of deep water (> 100 m) canyon habitats in Soquel Canyon and off Big Creek.



Package 4

- Conservation value would be stronger if estuarine habitats of Elkhorn Slough and Morro Bay were protected.
- The small (< 3 mi long) SMRs should be extended to meet SAT size guidelines.

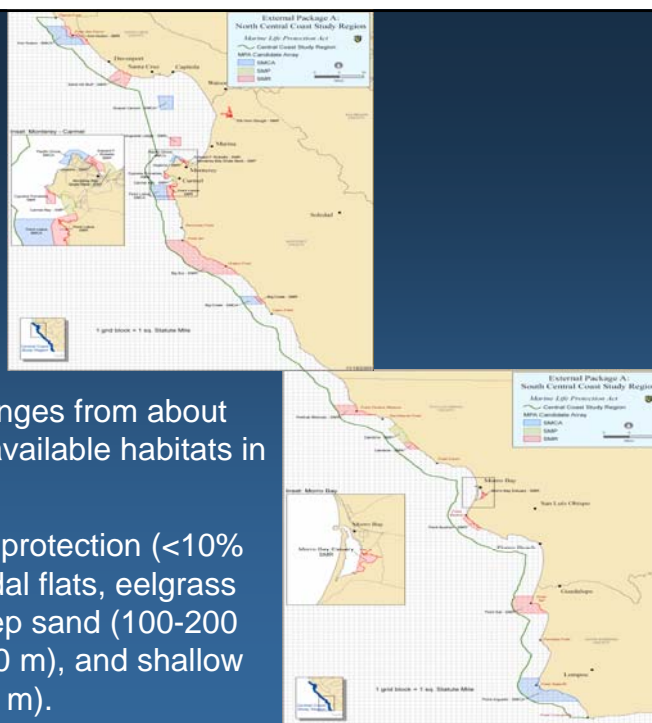


Package A

- Most habitats appear to have adequate conservation value.

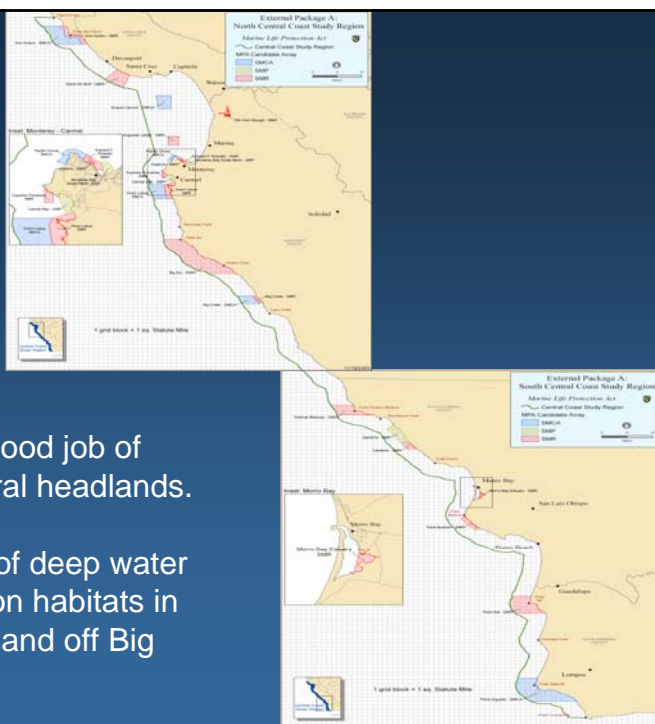
Strong protection ranges from about 10% to 35% of the available habitats in this region.

Habitats with lesser protection (<10% available) include tidal flats, eelgrass beds, estuarine, deep sand (100-200 m), deep rock (> 200 m), and shallow canyon heads (0-30 m).



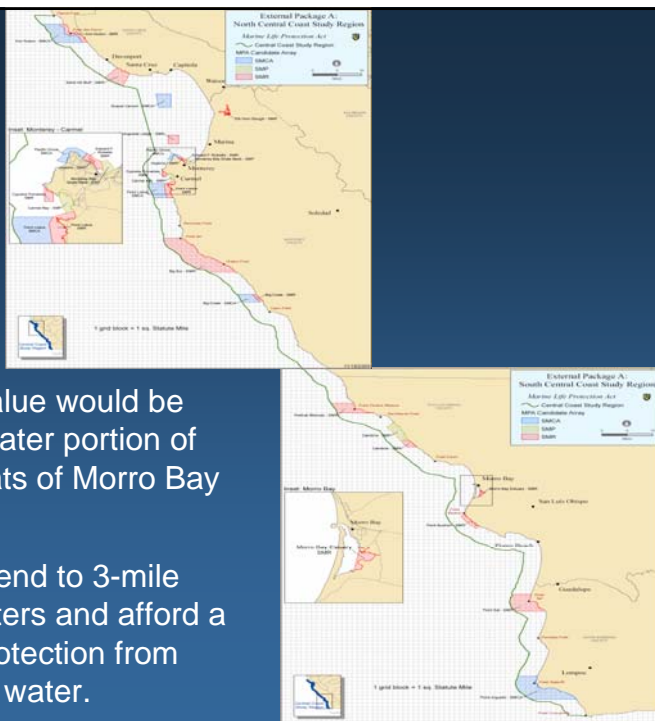
Package A

- Generally does good job of protecting several headlands.
- Good protection of deep water (> 100 m) canyon habitats in Soquel Canyon and off Big Creek.



Package A

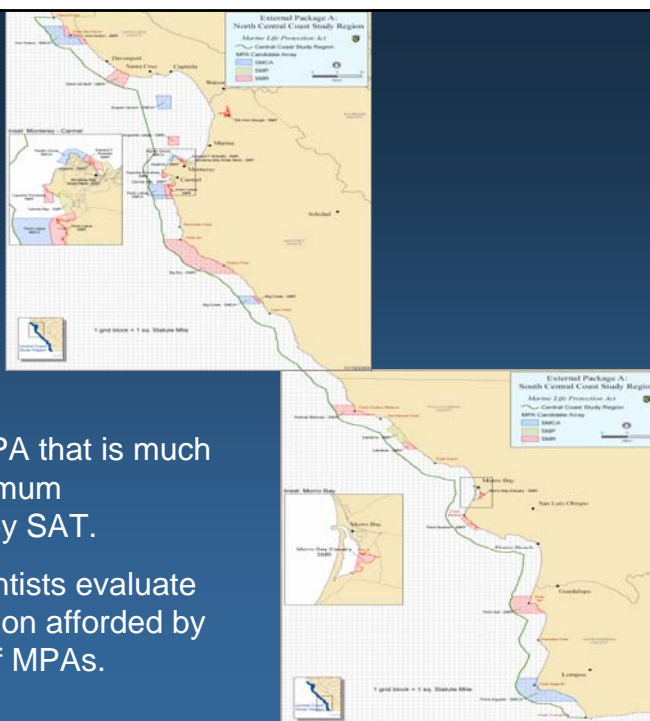
- Conservation value would be stronger if a greater portion of estuarine habitats of Morro Bay were protected.
- Many MPAs extend to 3-mile limit of state waters and afford a continuum of protection from shallow to deep water.



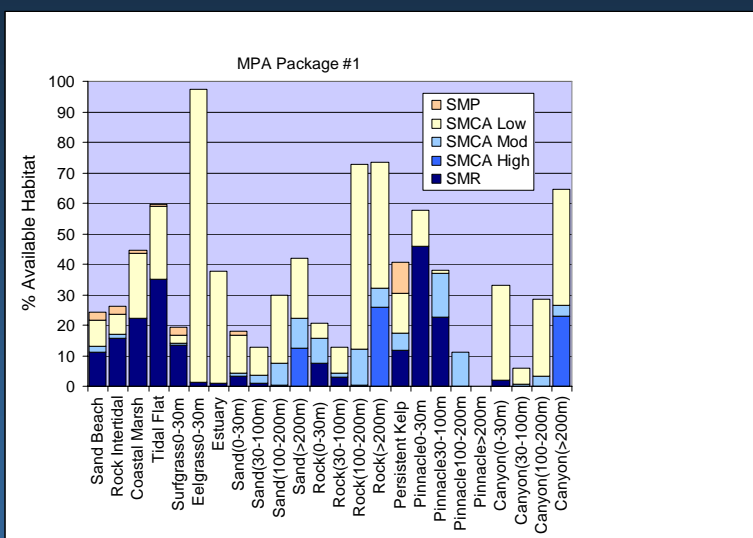
Package A

- Includes one MPA that is much larger than minimum recommended by SAT.

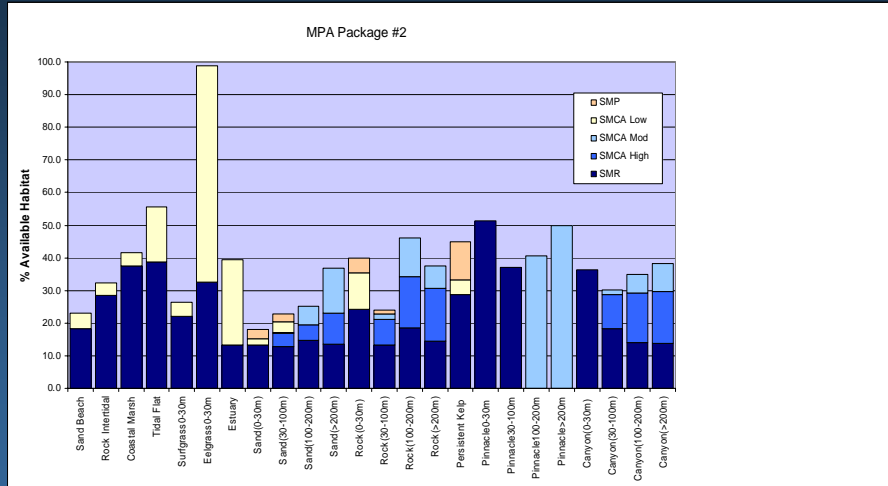
Would help scientists evaluate levels of protection afforded by different sizes of MPAs.



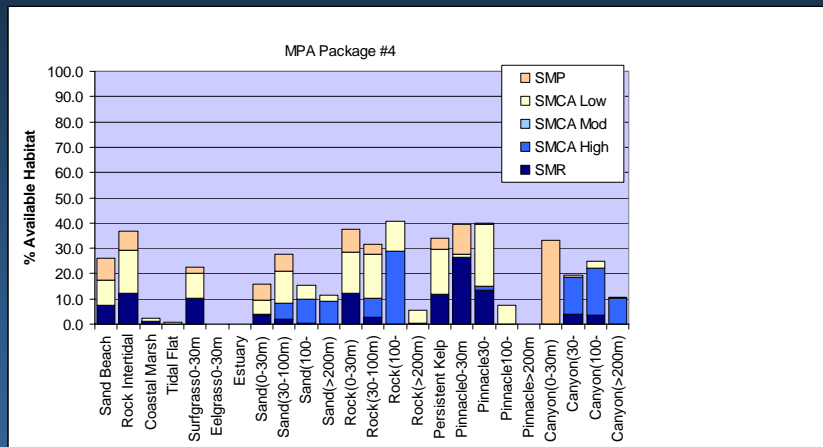
Package 1



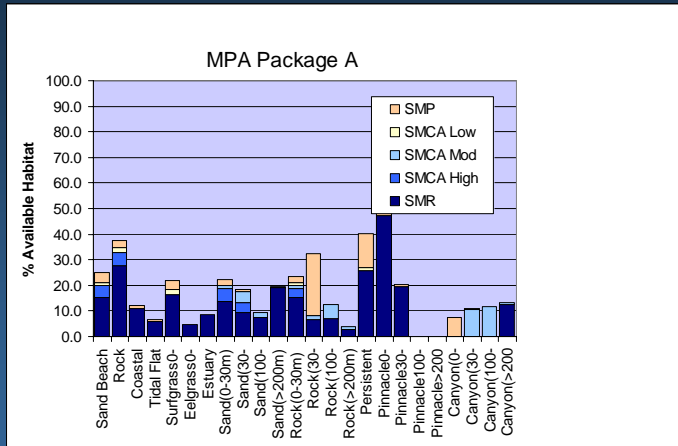
Package 2



Package 4



Package A



Draft Size & Spacing Analysis of Candidate MPA Packages in the Central Coast Study Region

(Draft)

Presented by Dr. Steve Gaines
MLPA Master Plan Science Advisory Team

Presentation to the MLPA Blue Ribbon Task Force
November 29, 2005 • Monterey, CA

Methods Habitat Scores

Package X	Ano Nuevo SMR	Ano Nuevo SMCA	Natural Bridges SMR	Natural Bridges SMCA	Soquel Canyon SMCA	Portuguese Ledge SMCA	Hopkins SMR	Pacific Grove SMCA	Carmel Bay SMP	Point Lobos SMR	Point Lobos SMCA	Big Sur (Pt Sur) SMCA	Julia Pfeiffer Burns SMR	Big Creek SMR	Big Creek SMCA	Salmon Creek SMR	Piedras Blancas SMCA	Cambria SMCA	Cambria SMR	Point Buchon SMCA	Purisma Point SMCA	Point Conception SMP
Rocky Intertidal																						
Rocky 0 - 30																						
Rocky 30 - 100																						
Rocky 100 - 200																						
Rocky 200 - 3000																						
Soft 0 - 30																						
Soft 30 - 100																						
Soft 100 - 200																						
Soft 200 - 3000																						
Persistent Kelp																						
Seagrasses																						
Estuary																						
Submar. Canyon																						
Upwelling Center																						
Pinnacles																						

Methods Habitat Scores

Package X	Ano Nuevo SMR	Ano Nuevo SMCA	Natural Bridges SMR	Natural Bridges SMCA	Soquel Canyon SMCA	Portuguese Ledge SMCA	Hopkins SMR	Pacific Grove SMCA	Carmel Bay SMP	Point Lobos SMR	Point Lobos SMCA	Big Sur (Pt Sur) SMCA	Julia Pfeiffer Burns SMR	Big Creek SMR	Big Creek SMCA	Salmon Creek SMR	Piedras Blancas SMCA	Cambria SMR	Point Buchon SMCA	Purisma Point SMCA	Point Conception SMP
Rocky Intertidal																					
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Estuary																					
Submar. Canyon																					
Upwelling Center																					
Pinnacles																					

Rate
Habitat
Protection

Methods Habitat Scores

Package X	Habitat	Ano Nuevo SMR	Ano Nuevo SMCA	Natural Bridges SMR	Natural Bridges SMCA	Soquel Canyon SMCA	Portuguese Ledge SMCA	Hopkins SMR	Pacific Grove SMCA	Carmel Bay SMP
Coarse % of MPA	Rocky Intertidal		31.57%	46.46%	51.10%			70.15%	64.84%	48.88%
	Rocky 0 - 30	36.49%	0.00%	51.49%	16.88%	0.00%	0.00%	23.94%	17.06%	22.53%
	Rocky 30 - 100	0.00%	0.00%	17.59%	8.32%	7.74%	4.12%	0.00%	26.67%	3.01%
	Rocky 100 - 200	0.00%	0.00%	0.00%	0.00%	8.13%	18.39%	0.00%	0.00%	0.00%
	Rocky 200 - 3000	0.00%	0.00%	0.00%	0.00%	3.14%	0.00%	0.00%	0.00%	0.00%
	Soft 0 - 30	60.29%	7.54%	8.28%	3.62%	0.00%	0.00%	50.30%	16.94%	41.49%
	Soft 30 - 100	2.68%	92.43%	21.84%	70.95%	61.32%	43.36%	0.00%	24.42%	3.37%
	Soft 100 - 200	0.00%	0.00%	0.00%	0.00%	7.54%	34.09%	0.00%	0.00%	0.00%
	Soft 200 - 3000	0.00%	0.00%	0.00%	0.00%	12.14%	0.00%	0.00%	0.00%	0.00%
	Persistent Kelp	0.00%	0.00%	0.34%	0.37%	0.00%	0.00%	17.58%	1.29%	5.46%
	Seagrasses									
	Estuary									
	Submarine Canyon									
	Upwelling Center									
	Pinnacles									
Coarse Area	Total Shore Length	14.268	0	3.857	6.754	0	0	2.141	7.764	7.04
	Total Area in MPA	9.68	18.41	2.61	21.11	20.87	9.31	0.33	5.13	2.49
	Rocky 0 - 30	3.532	0	1.34	3.563			0.079	0.875	0.561
	Rocky 30 - 100	0	0	0.46	1.757	1.616	0.384		1.368	0.075
	Rocky 100 - 200					1.697	1.712			
	Rocky 200 - 3000					0.656				
	Soft 0 - 30	5.836	1.389	0.22	0.765			0.166	0.869	1.033
	Soft 30 - 100	0.259	17.017	0.57	14.977	12.798	4.037		1.253	0.084
	Soft 100 - 200					1.573	3.174			
	Soft 200 - 3000					2.533				
	Persistent Kelp	0	0	0.009	0.079	0	0	0.058	0.066	0.136
	Rocky Intertidal	4.51	0.00	1.79	3.45	0.00	0.00	1.50	5.03	3.44

Compile Data on Habitats

Methods Habitat Scores



ID
Major
Habitats
in
each
MPA

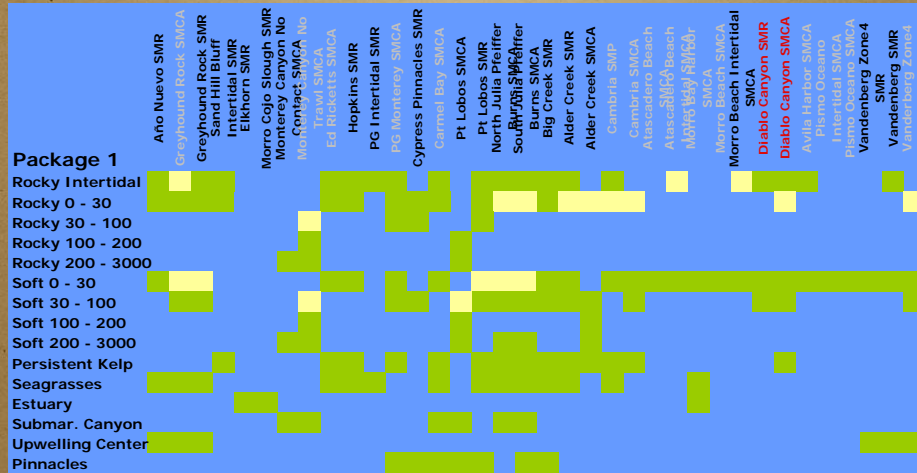
Lenient Standards

Methods Habitat Scores

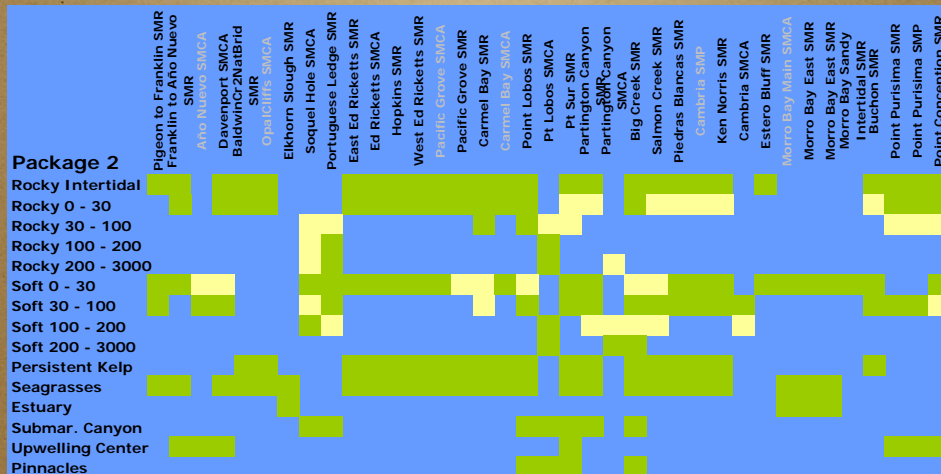


Add
Habitats
via
More
Lenient
Criteria

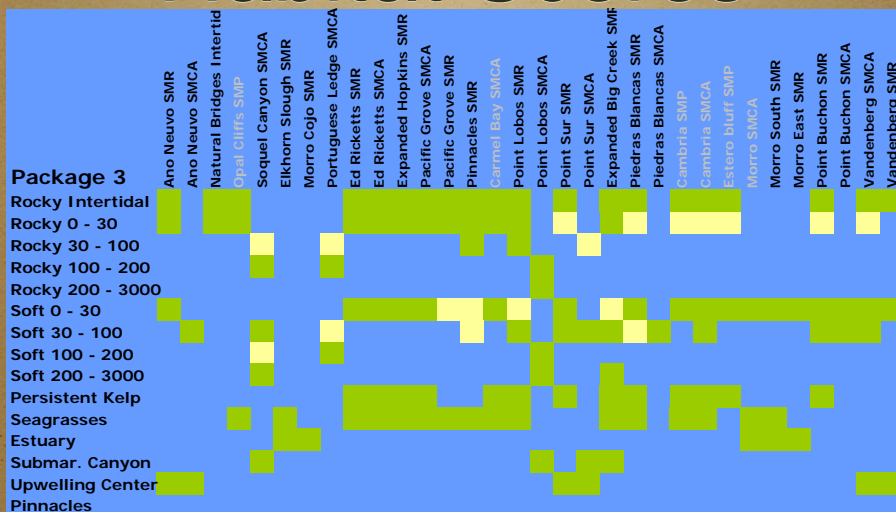
Package 1 Habitat Scores



Package 2 Habitat Scores



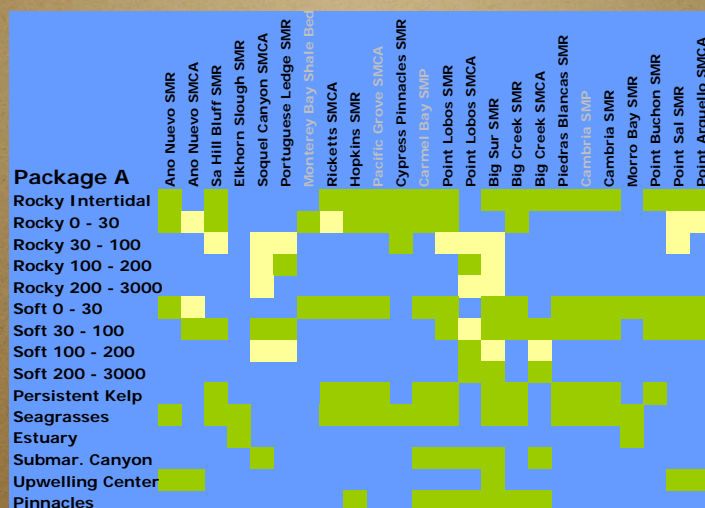
Package 3 Habitat Scores



Package 4 Habitat Scores



Package A Habitat Scores



Package C Habitat Scores



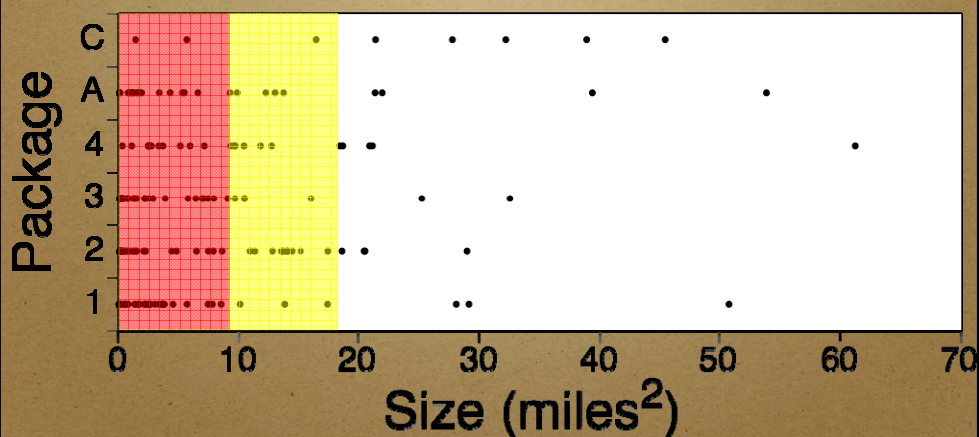
MPA Sizes

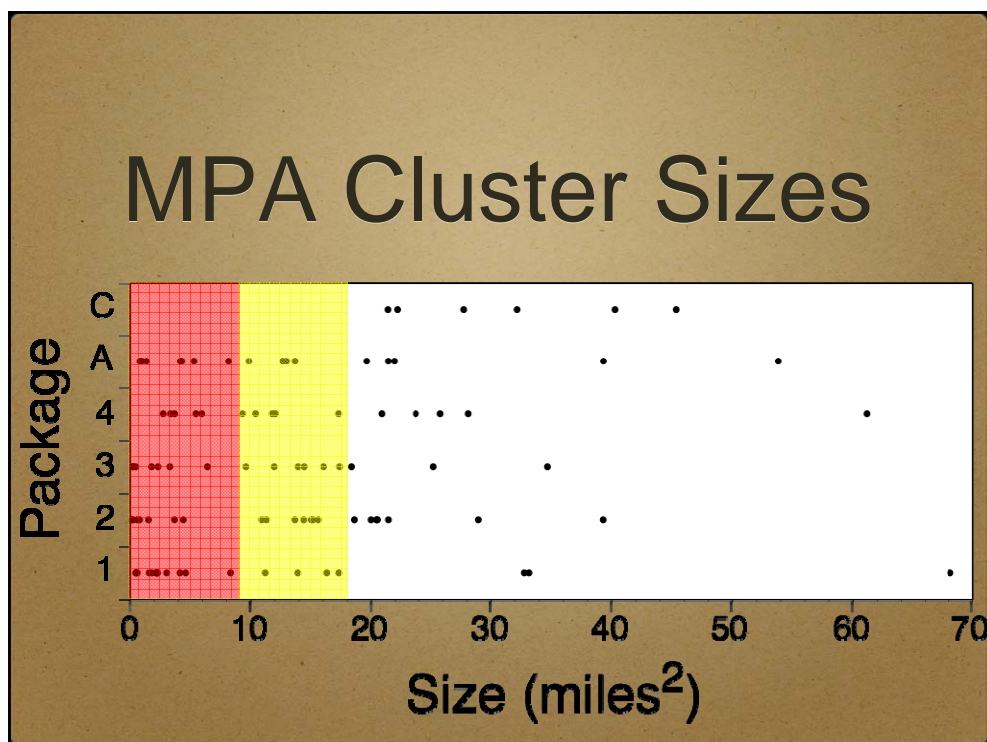
- Minimum: 3 to 6 miles alongshore
- Ideal: 12 miles alongshore
- Where possible, connect inshore and offshore habitats, i.e. 3 miles offshore
- Therefore:

Minimum area: 9 to 18 miles²

Ideal area: 36 miles²

MPA Sizes by Package





Package Size Summary

	Small	Minimum	Middle	Ideal
Size				
Package 1	60%	20%	15%	5%
Package 2	33%	33%	29%	5%
Package 3	44%	31%	25%	
Package 4	33%	27%	33%	7%
Package A	38%	31%	19%	13%
Package C			67%	33%

Ignores: Habitat Fraction, Level of Protection
Therefore: Overestimate Effective Sizes

MPA Spacing

- Guidelines: 30 to 60 miles maximum spacing
- Since MPA sizes are small, we used strictest end of this guideline as a target

Methods Spacing Scores



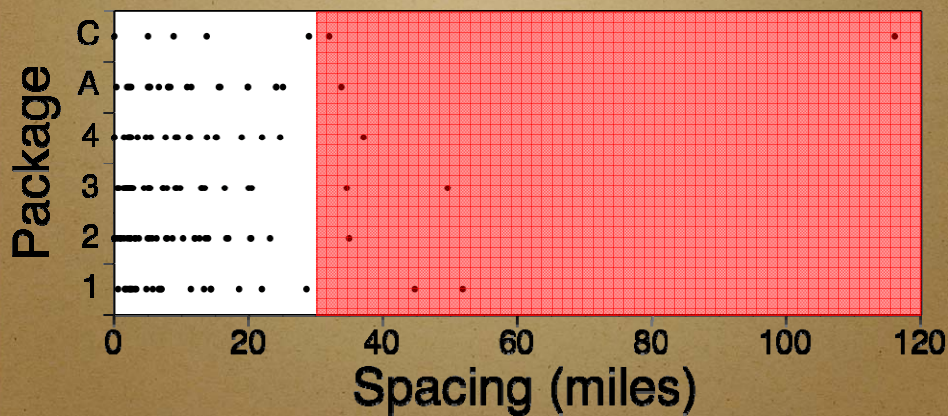
Species
in each
Habitat
"See"
Different
Networks

Multiple Networks

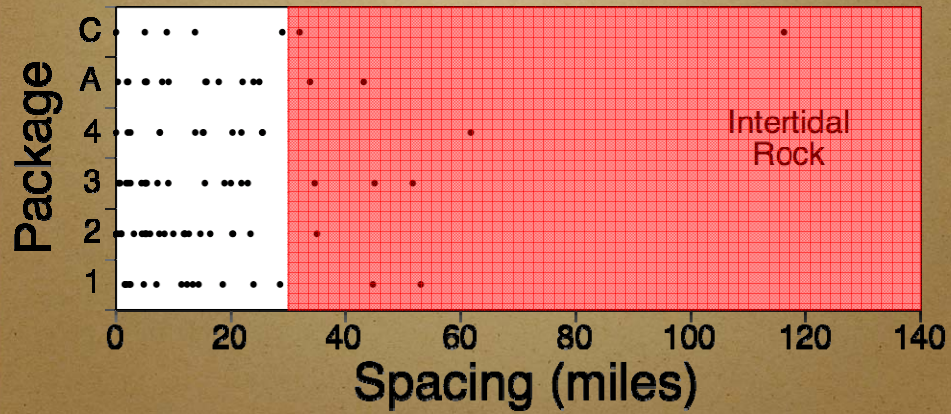
MPAs	Distance	Intertidal	Distance	Rocky 0 - 20	Distance	Rocky 30 - 100	Distance	Rocky 100 - 200	Distance	Rocky 200 - 3000	Distance
Año Nuevo SMCA	2.5	Año Nuevo SMCA	2.5	Año Nuevo SMR	2.5	Natural Bridges SMR	22.7	Soquel Canyon SMCA	31.8	Soquel Canyon SMCA	31.8
Año Nuevo SMR	0	Natural Bridges SMR	20.2	Natural Bridges SMR	20.2	Soquel Canyon SMCA	9.0856	Portuguese Ledge SMCA	9.4	Point Lobos SMCA	205
Natural Bridges SMCA	18.8928	Hopkins SMR	25.5	Hopkins SMR	25.5	Portuguese Ledge SMCA	9.4	Point Lobos SMCA	16.6		
Natural Bridges SMR	1.4432	Point Lobos SMR	7.6	Point Lobos SMR	7.6	Point Lobos SMR	14.6		170		
Soquel Canyon SMCA	9.0856	Point Lobos SMCA	2.0336	Point Lobos SMCA	2.0336	Point Lobos SMCA	2.0336				
Portuguese Ledge SMCA	9.4	Big Sur SMCA	15.1864	Big Sur SMCA	15.1864	Big Sur SMCA	15.1864				
Pacific Grove SMCA	4.7	Julia Pfaffter Burns SMR	15.0552	Big Creek SMR	22.6	Purisma Point SMCA	131.8				
Hopkins SMR	2.33208	Big Creek SMCA	7.6	Salmon Creek SMR	21.9104	Point Conception SMP	13.74				
Carmel Bay SMP	5.412	Salmon Creek SMR	21.9104	Cambria SMR	25.6		0				
Point Lobos SMR	2.1976	Cambria SMR	25.6	Purisma Point SMCA	61.7						
Point Lobos SMCA	2.0336	Purisma Point SMCA	61.7	Point Conception SMP	13.74						
Big Sur SMCA	15.1864	Point Conception SMP	13.74		0						
Julia Pfaffter Burns SMR	15.0552		0								
Big Creek SMCA	7.6										
Big Creek SMR	0										
Salmon Creek SMR	21.9104										
Piedras Blancas SMCA	11.0536										
Cambria SMCA	11.2176										
Point Buchon SMCA	3.444										
Purisma Point SMCA	24.6										
Point Conception SMP	37.1										
	13.74										
	0										

Measure
Spacings

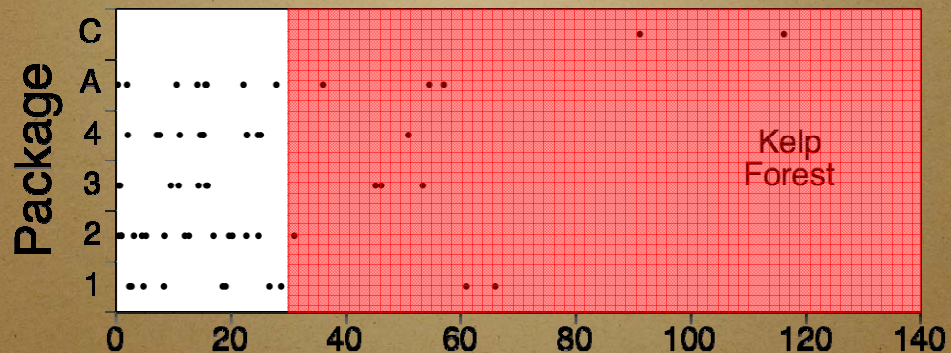
Spacings All MPAs

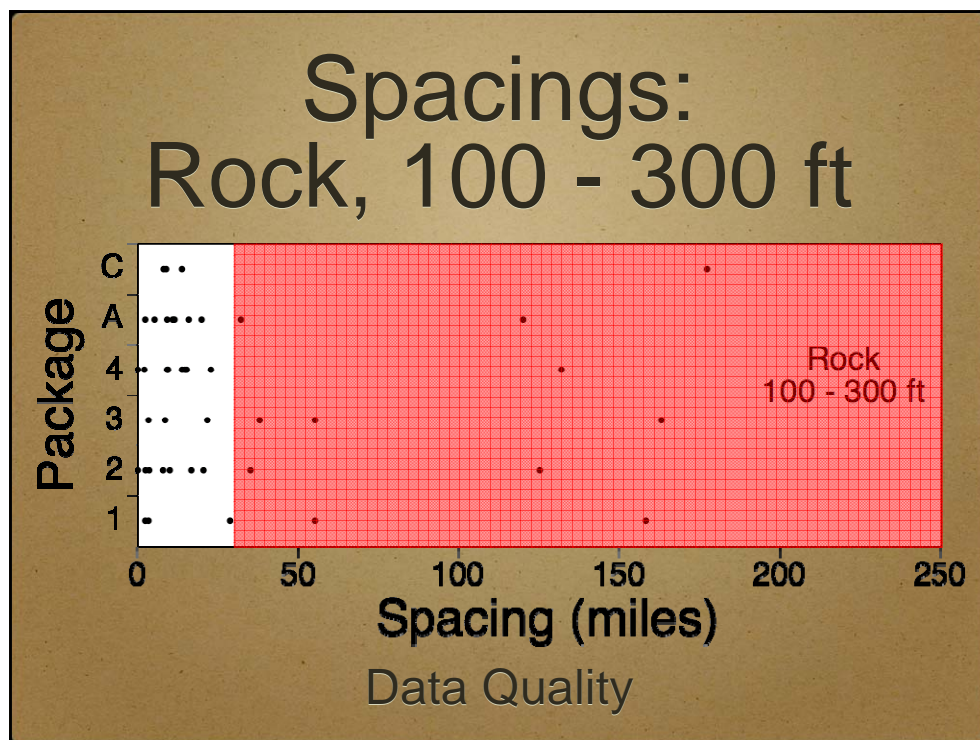
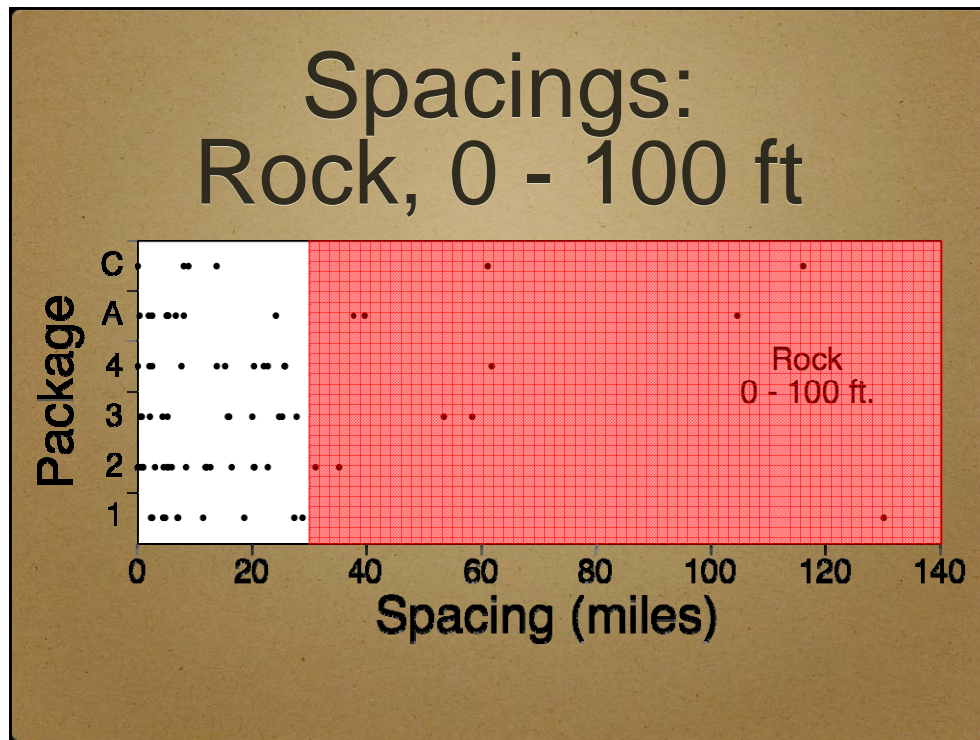


Spacings: Intertidal

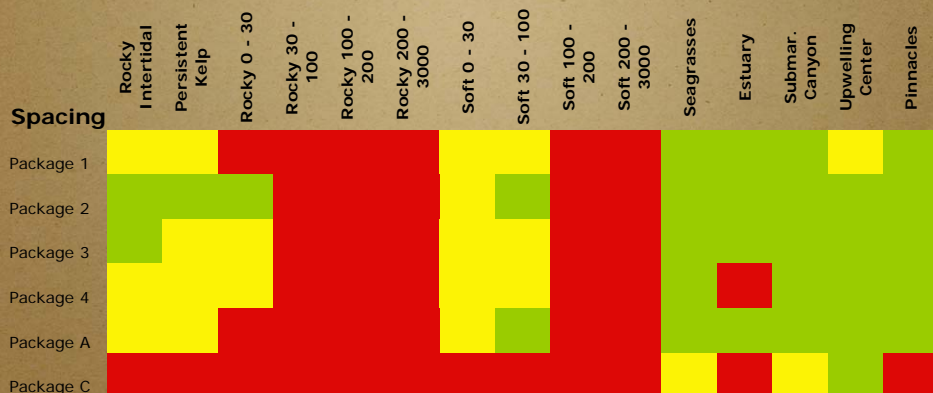


Spacings: Kelp Forests

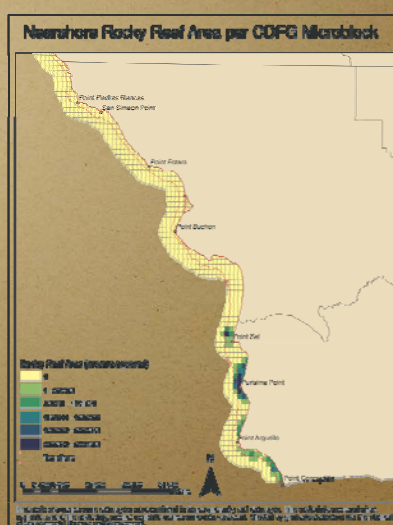
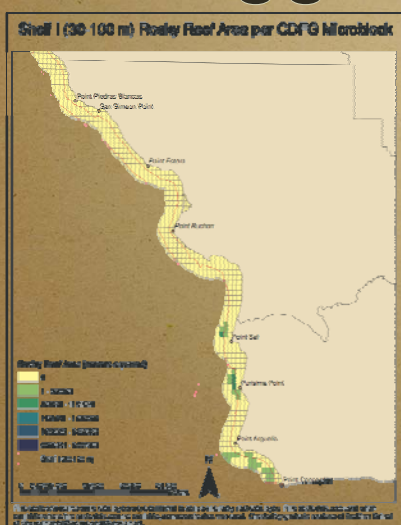




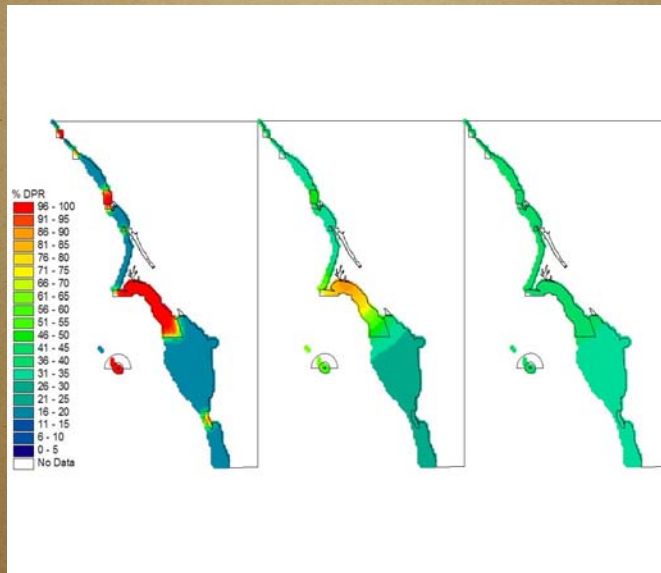
Package Spacing Scores



Suggested Fixes



Still to Come



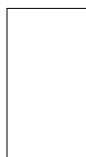
Monitoring and evaluation summary for MPA systems

Presented by Dr. Steve Palumbi
Master Plan Science Advisory Team
Central Coast Science Sub-Team

Presented to the MLPA Blue Ribbon Task Force
November 29-30, 2005 • Monterey, CA

Monitoring MPAs and evaluating their performance

Three broad classes of comparisons:



Open access



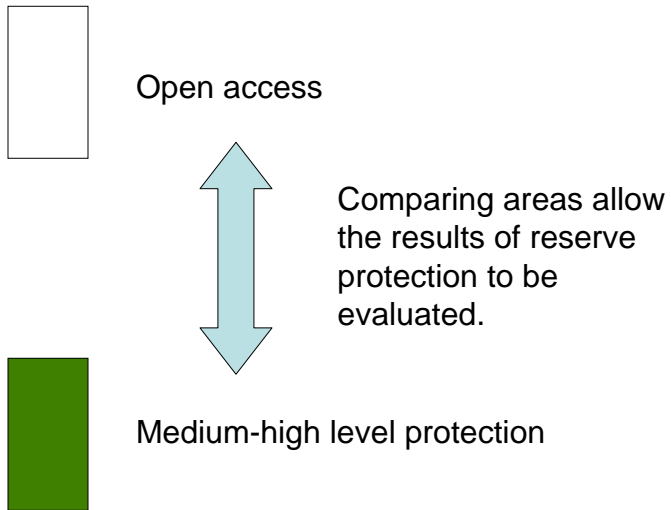
Low level protection



Medium-high level protection

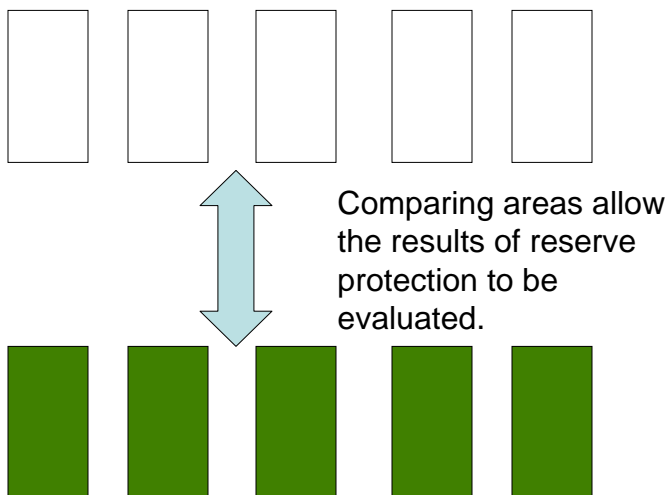
Monitoring MPAs and evaluating their performance

Three broad classes of comparisons:



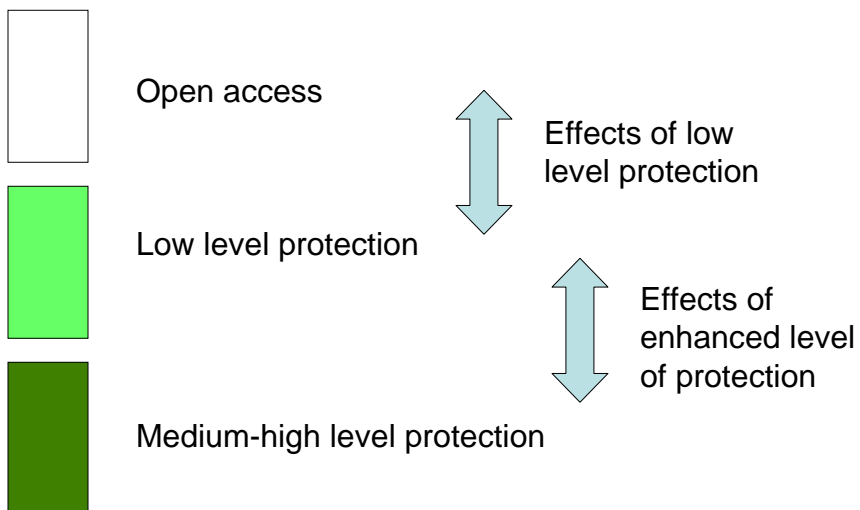
But two areas may differ in more than just levels of protection

Typical experiments use replicates of every treatment



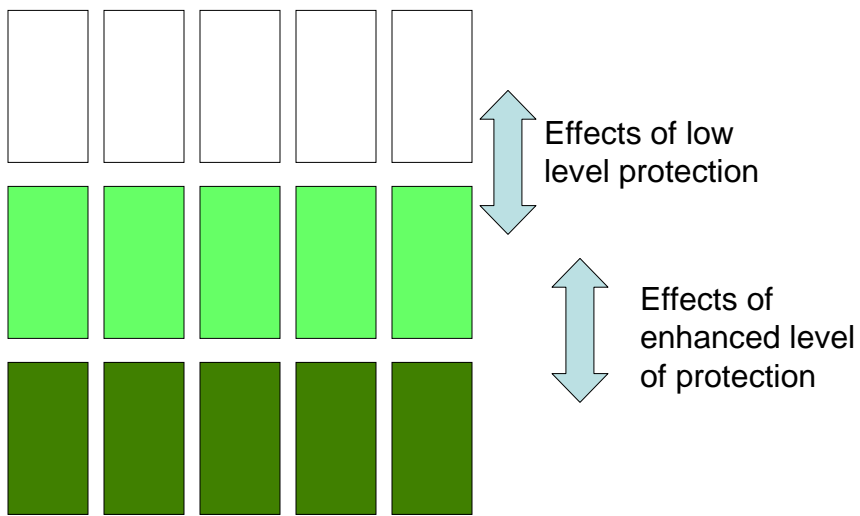
Monitoring MPAs and evaluating their performance

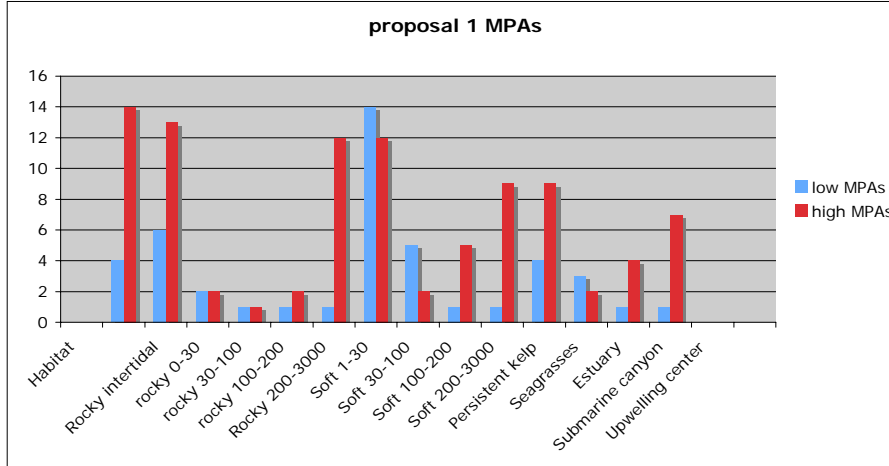
Three broad classes of comparisons:



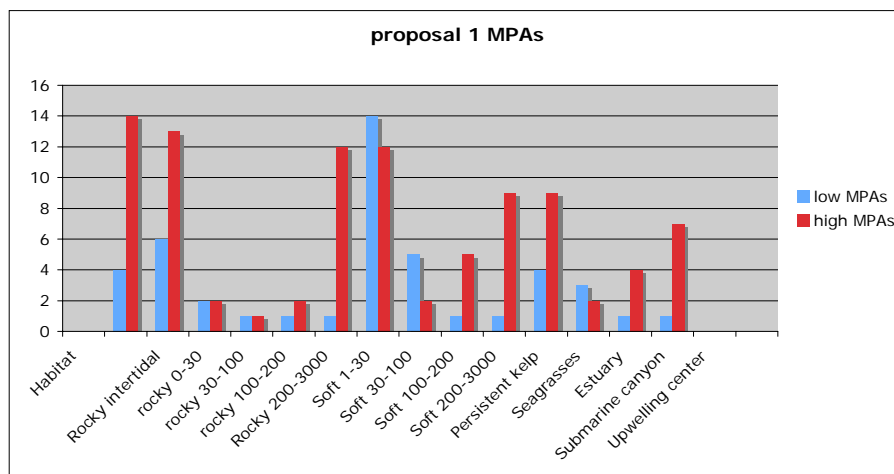
Monitoring MPAs and evaluating their performance

Three broad classes of comparisons:

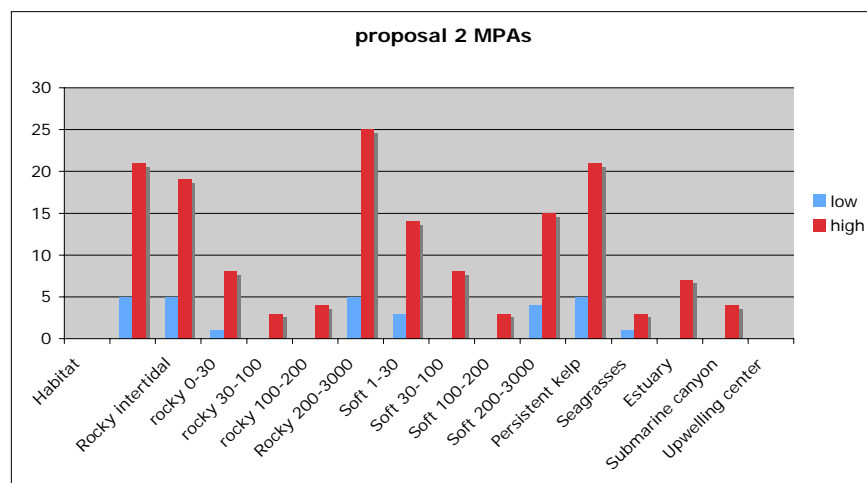




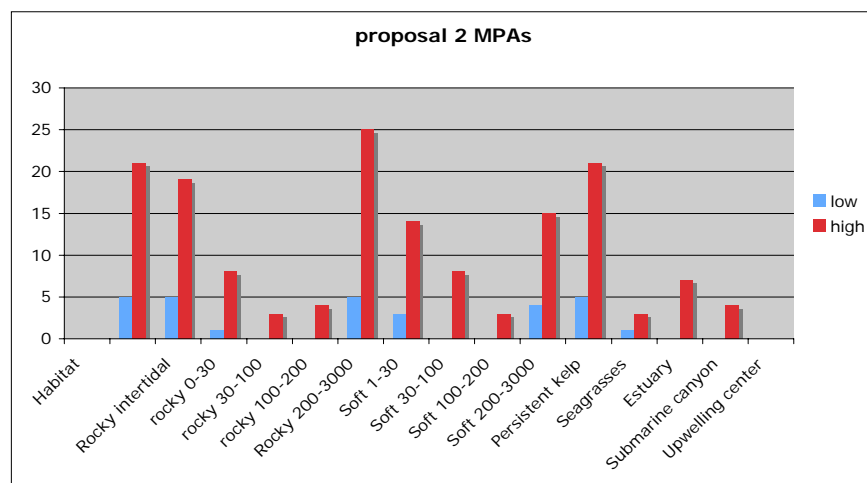
A large number of MPAs with high levels of protection occur in shallow waters, particularly in the rocky intertidal and soft-sediment areas less than 30 feet in depth. Replication in deeper water environments is much less common, with poor protection for rocky substrates deeper than 30 feet or for estuaries. Soft sediment areas 30-100 deep have better protection, but deeper than 100 ft, there is very little replication of MPAs of any kind.



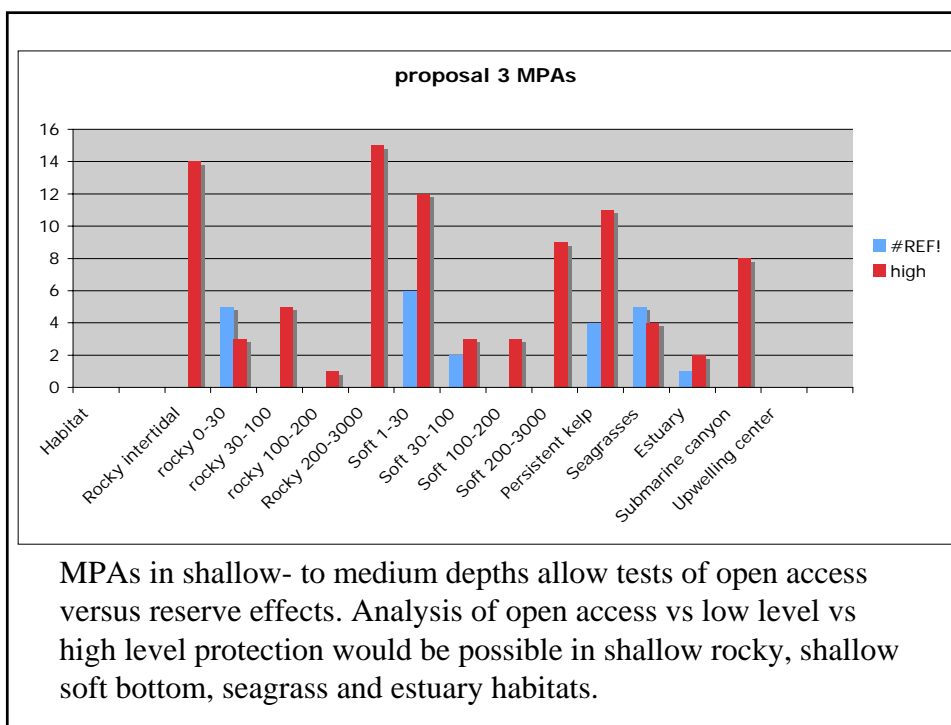
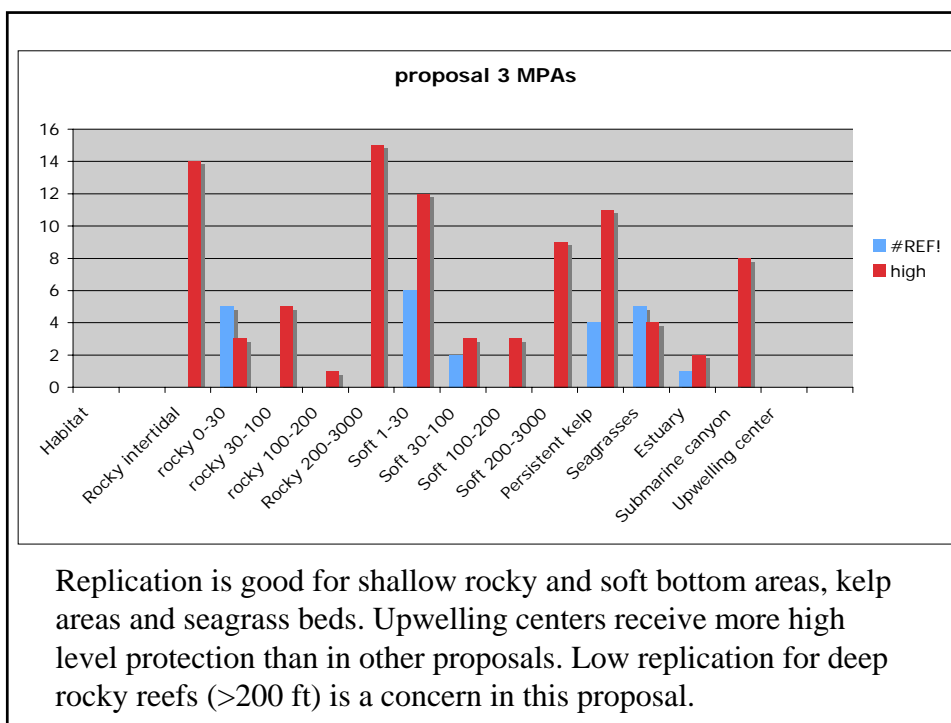
MPAs in shallow depths allow tests of open access versus reserve effects. Contrasts in results for no-MPA vs low vs high level MPA protection could be studied for shallow water areas, as well as for area with seagrasses. Few studies of protection of deep protection would be possible.

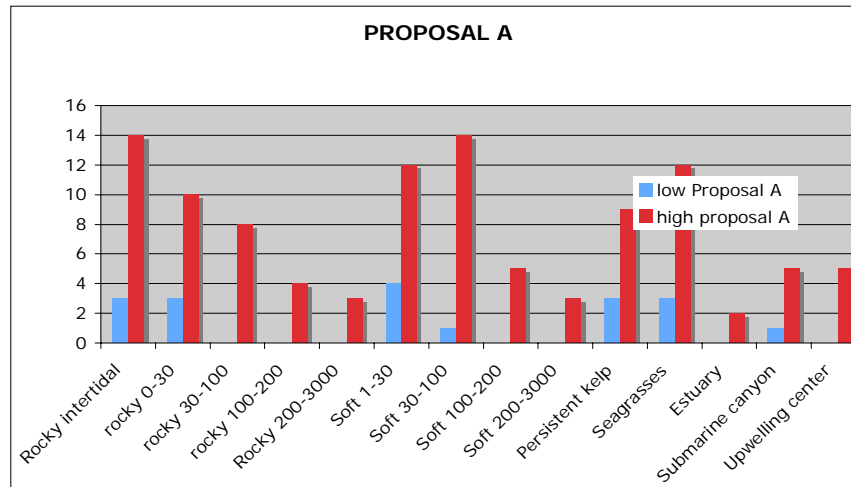
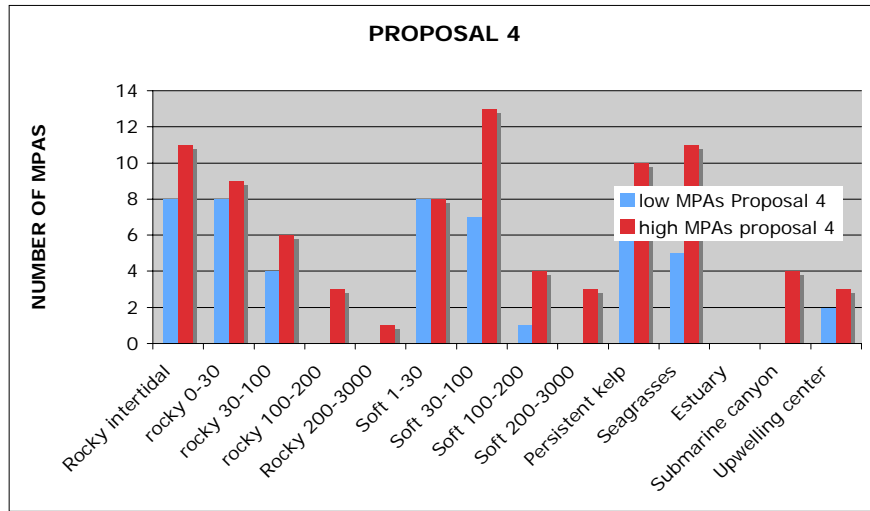


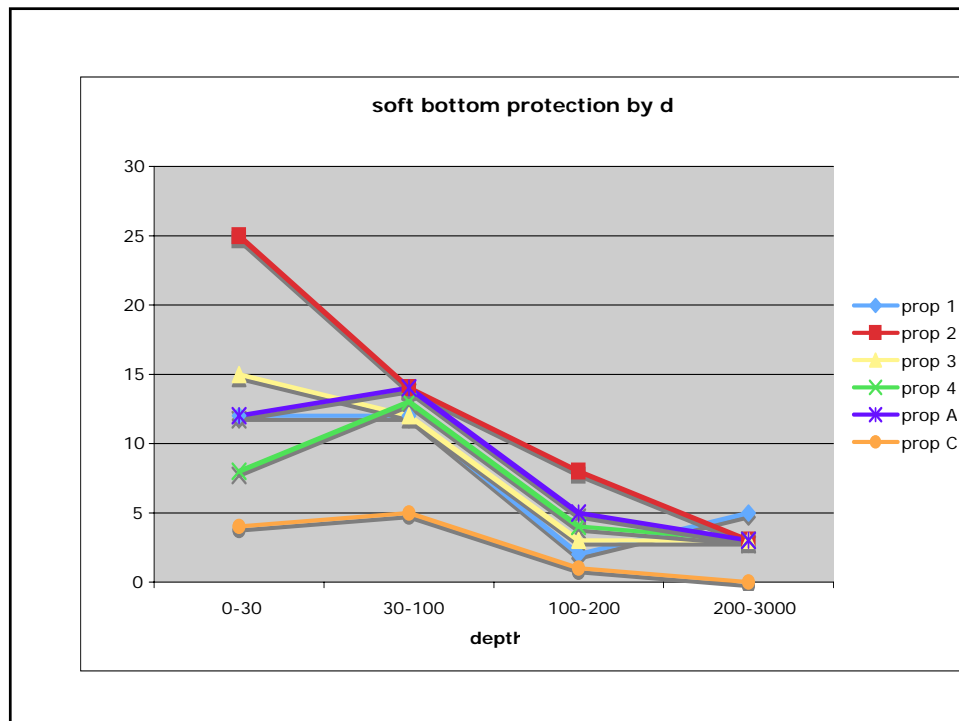
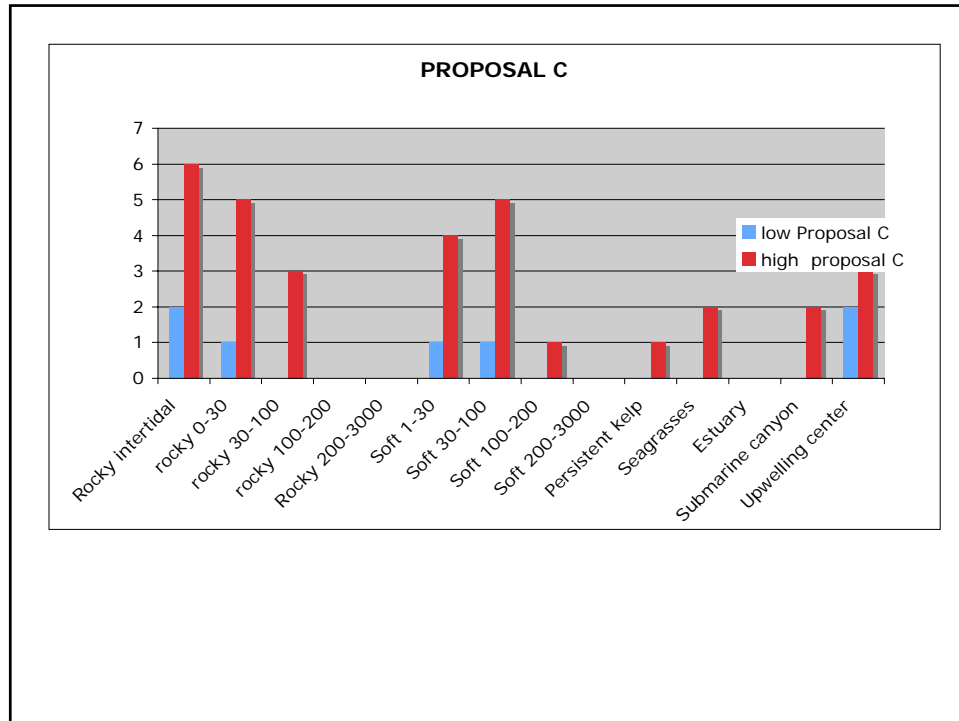
Replication numbers for highly protected MPAs are good for shallow – to - medium depth rocky and soft bottom habitats, kelp, and seagrass areas. Less replication is present in deep rocky areas, but all seem to have at least 3 replicate MPAs.

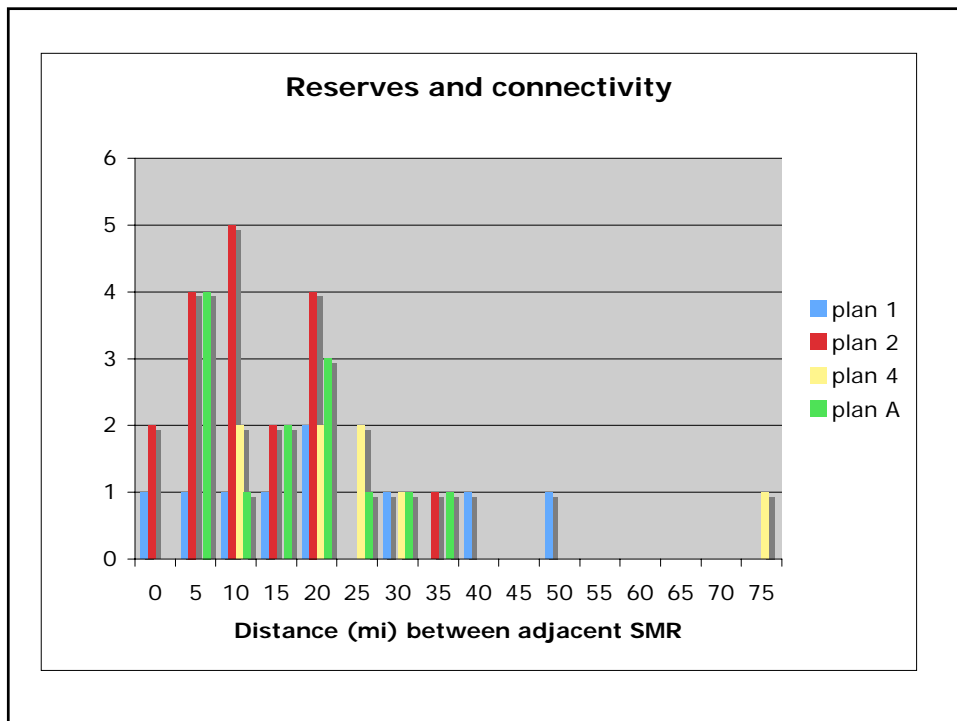
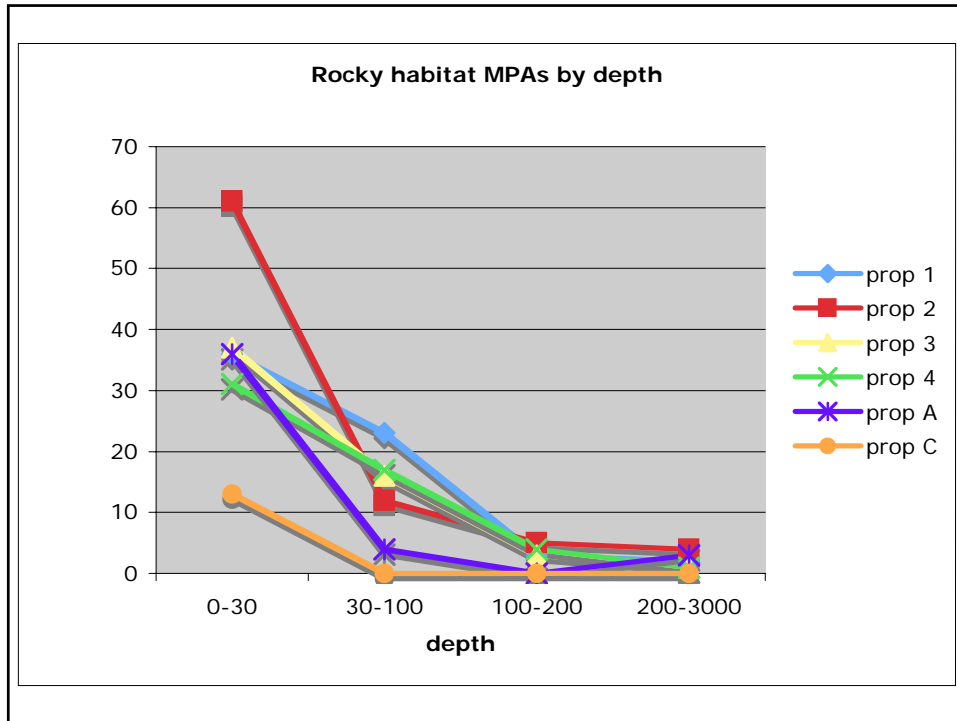


MPAs in shallow- to medium depths allow tests of open access versus reserve effects. Comparisons between open access, high protection and low protection would be possible for shallow rocky habitats, shallow soft bottom habitats and persistent kelp habitats.









California Marine Life Protection Act Initiative												
MLPA Master Plan Science Advisory Team - Central Coast Sub-Team												
Analysis of Habitats by Depth for Candidate MPA Packages in the Central Coast Study Region												
"November 29, 2005"												
Habitat	low MPAs	low	low	low MPAs	low	low	high MPAs	high	high	high MPAs	high	high
	Proposal 1	Proposal 2	Proposal 3	Proposal 4	Proposal A	Proposal C	proposal 1	proposal 2	proposal 3	proposal 4	proposal A	proposal C
Rocky intertidal	4	5	6	8	3	2	14	21	12	11	14	6
rocky 0-30	6	5	5	8	3	1	13	19	14	9	10	5
rocky 30-100	2	1	0	4	0	0	2	8	3	6	8	3
rocky 100-200	1	0	0	0	0	0	1	3	5	3	4	0
Rocky 200-3000	1	0	0	0	0	0	2	4	1	1	3	0
Soft 1-30	1	5	6	8	4	1	12	25	15	8	12	4
Soft 30-100	14	3	2	7	1	1	12	14	12	13	14	5
Soft 100-200	5	0	0	1	0	0	2	8	3	4	5	1
Soft 200-3000	1	0	0	0	0	0	5	3	3	3	3	0
Persistent kelp	1	4	4	7	3	0	9	15	9	10	9	1
Seagrasses	4	5	5	5	3	0	9	21	11	11	12	2
Estuary	3	1	1	0	0	0	2	3	4	0	2	0
Submarine canyon	1	0	0	0	1	0	4	7	2	4	5	2
Upwelling center	1	0	0	2	0	2	7	4	8	3	5	3
Rocky habitats	prop 1	prop 2	prop 3	prop 4	prop A	prop C						
0-30	36	61	37	31	36	13						
30-100	23	12	16	17	4	0						
100-200	3	5	3	4	0	0						
200-3000	2	4	1	1	3	0						
Soft bottom habitats	prop 1	prop 2	prop 3	prop 4	prop A	prop C						
0-30	12	25	15	8	12	4						
30-100	12	14	12	13	14	5						
100-200	2	8	3	4	5	1						
200-3000	5	3	3	3	3	0						